

43. At least two state regulatory agencies, for example, rejected bill and keep outright as an interconnection pricing solution for LEC interconnection. The Maryland Public Service Commission (PSC) rejected MFS's request for a bill and keep arrangement for termination of traffic between it and Bell Atlantic, agreeing with Bell Atlantic that it and MFS should charge for access to their networks based on the interexchange carrier access tariffs.⁴² Recognizing the need for incumbent carriers to recover fixed network costs, the PSC held that

a competitive carrier should be required to make a contribution to that portion of the joint and common costs of the ubiquitous network that was heretofore provided by the local business service which the incumbent carrier will lose to competition. (Id. at 123).

Recently, the Maryland PSC affirmed its decision and implemented rates in lieu of a bill and keep arrangement.⁴³ Similarly, the Illinois Commerce Commission adopted a reciprocal compensation plan in which the interconnection rate fundamentally rejects the notion of bill and keep. Its pricing structure

- (1) reflects the long run service incremental cost of terminating calls,
- (2) provides a reasonable level of contribution to Illinois Bell's overhead costs, and
- (3) allows Illinois Bell to pass an imputation test for local traffic.⁴⁴

44. Among states that use bill and keep, none appear to require it for CMRS-wireline interconnection and nowhere does it appear to be permanent. In California, the California Public Utilities Commission (CPUC) authorized bill and keep on an interim basis only;⁴⁵ it will re-assess the effectiveness and fairness of bill and keep and decide whether or not to adopt an alternative call termination approach. The CPUC noted its policy preference for approving tariffed service prices that reflect costs and for applying that principle to call termination

⁴² *MFS Intelenet of Maryland, Inc.*, 152 PUR4th 102 (Md. P.S.C., Case No. 8584, Order No. 7155, 1994), at 120.

⁴³ *MFS Intelenet of Maryland, Inc.*, 1995 Md. PSC LEXIS 261 (MD PSC, Case No. 8584, Phase II, Order No. 72348, December 28, 1995).

⁴⁴ *Illinois Bell Telephone Company*, PUR4th (IL Commerce Commission, 94-0096, 94-0117, 94-0146, 1995).

⁴⁵ *Competition for Local Exchange Service*, (CA PUC R 95-04-043 I 95-04-044, Decision 95-07-054, 1995).

services, so that its interim bill and keep policy should in no way be regarded as its final policy choice. In Michigan, the PSC adopted bill and keep as long as traffic between interconnecting carriers is within 5 percent of balance.⁴⁶ In Iowa, the Board distinguished between bill and keep among non-competing monopoly LECs and interconnection among competing carriers

Bill and keep may have been acceptable in a situation where extended area service traffic was exchanged between monopoly local service providers. It is an unacceptable pricing mechanism for local service traffic exchange between competing local exchange utilities. Cost-based pricing of the services provided is essential in the competitive market. Permanent bill and keep methodology would be looking backward to the monopoly regulation of the past, rather than forward to the regulation of competitive utilities in the future.⁴⁷

The Washington Utilities and Transportation Commission adopted bill and keep as an interim measure for interconnection among LECs.

reiterat(ing) its view that over the long-term the bill and keep mechanism neither reflects sound economic principles nor provides the flexibility to accommodate the diversity likely to result from competition among local exchange companies, even though it may be an appropriate long-term mechanism under some circumstances.⁴⁸

In Connecticut, bill and keep would be the basis for LEC interconnection for nine months to judge the balance of traffic. If traffic proves to be balanced, bill and keep would remain for an additional 12 months; if traffic is unbalanced, carriers would true up and set reciprocal compensation rates.⁴⁹

45. In addition, the fact that CMRS interconnection rates differ across the states does not imply that federal homogeneity is necessary for the development of the wireless industry.

⁴⁶ *City Signal Inc.*, 159 PUR4th 532, 547-48 (MI PSC, Case No. U-10647, 1995)

⁴⁷ *McLeod Telemanagement Inc.*, 161 PUR4th 605 (Iowa U.B., Docket No. TCU-94-4, 1995).

⁴⁸ *Washington Utilities and Transportation Commission v. US West Communications*, Docket Nos. UT-941464, UT-941465, UT-950146, 6th Suppl. Order, Slip Opinion, December 27, 1995 at 12.

⁴⁹ *State Telephone Regulatory Report*, October 5, 1995.

States have historically adopted different solutions to the universal service problem, recovering widely different proportions of fixed common costs from different services. Some states choose low local exchange rates and high usage rates; others price local exchange service closer to cost and reduce toll, carrier access and local usage prices correspondingly. If competitive market forces were permitted to set *all* local telephone rates, market interconnection prices would probably not vary much across the states. However, mandatory uniform interconnection rates would not make sense in the actual world where the distribution of the contribution burden to support basic telephone service is far from uniform across states.

46. In short, the FCC's concerns regarding negotiated interconnection rates between CMRS and LEC networks have not yet surfaced in the states. Those states that have litigated LEC interconnection rules have not applied them to CMRS carriers, and where bill and keep has been adopted for competitive LEC interconnection, it has largely been implemented on an interim basis.

IV. PRICING STANDARDS AND RATE STRUCTURE/LEVEL DESIGN FOR LOCAL INTERCONNECTION

47. The Notice seeks comment on several questions of rate structure design and rate level for interconnection.⁵⁰ In this section, I review and offer an economist's perspective on these issues.

A. Rate Structure Issues

48. The FCC notes correctly that "... costs should be recovered in a manner that reflects the way they were incurred."⁵¹ This comports with the principle of cost causation, and following

⁵⁰ Notice at ¶¶42-65.

⁵¹ Notice at ¶42.

that principle, the FCC proposes a rate structure for interconnection that first distinguishes among dedicated and shared facilities, non-traffic sensitive (NTS) and traffic-sensitive (TS) costs, and peak and off-peak usage. Cost-causation certainly implies that fixed charges should recover costs of dedicated NTS facilities while usage-sensitive rates should apply to shared TS facilities. Moreover, in theory, a large component of TS rates should be different for peak and off-peak periods in order to recover incremental capacity costs from the peak-period users who cause capacity to expand

49. The FCC identifies a number of practical problems with, and seeks comment on, peak-sensitive pricing.⁵² In particular, it mentions problems with (i) predicting the peak period(s) associated with telephone traffic, (ii) changing peak periods as customers alter their calling behavior in response to set peak and off-peak rates, and (iii) administering a peak-load pricing system. The FCC also seeks comment on what these administrative costs might be and how peak-load pricing may be used to recover shared and common costs

50. There is a substantial theoretical and empirical literature on peak-load pricing, particularly as it pertains to public utilities and natural monopolies.⁵³ The phenomenon of shifting peak periods, in response to adjustments by price-responsive consumers in their calling patterns, is an indication of non-zero cross-price elasticities between calling at the peak and at the off-peak periods. While optimal marginal cost-based pricing structures for peak and off-peak periods exist, the additional need to pay for shared and common costs raises the need for second-best efficient pricing structures such as Ramsey pricing. Under this rate structure, the optimal peak and off-peak prices would both (i) be a function of the marginal cost, own- and cross-price elasticities, and other parameters and (ii) contribute to recovering fixed shared and common costs. Generally, cost differences would imply that the peak-period price would

⁵² Notice at ¶45-46.

⁵³ See, e.g., S.V. Berg and J. Tschirhart, *Natural Monopoly Regulation: Principles and Practice*, (Cambridge: Cambridge University Press, 1988), esp. Chapter 5 and references therein. Also see R.B. Wilson, *Nonlinear Pricing*, (New York: Oxford University Press, 1993) esp. Chapter 11.

exceed the off-peak price.⁵⁴ However, if off-peak demand were highly inelastic and peak demand were highly elastic in comparison, Ramsey pricing could deliver the opposite result—a higher off-peak price and a lower peak price. Using Ramsey principles to aid in rate design thus requires the ability to meter and price demand throughout the day and the year, as well as knowledge of returns to scale and the relevant time-of-day price elasticities.

51. Implementing time-of-day pricing has other drawbacks as well. First, it is obviously complex and requires careful study even to be able to understand the basic rate structure: i.e., whether peak prices should be higher or lower than off-peak prices. Second, the theoretical efficiency gains from implementing time-of-day pricing may not be attainable in practice because (i) prices cannot practically mirror the load distribution exactly, (ii) final consumers do not directly pay interconnection prices, so cost signals do not have a direct effect on consumers, and (iii) consumers pay one retail price in each period which—at best—reflects the time-of-day costs in that period averaged across local networks (in residential and business locations) and all other interconnecting networks.⁵⁵ Third, as interconnection markets are opened to competition, competitive forces—rather than economic theories—will begin to shape interconnection rate structures. If past experience in terminal equipment and long distance competition is any guide, what will likely emerge will be multi-part declining-block tariffs possibly tailored for individual and similarly-situated customers that reflect large differences in demands and costs *across customers* rather than comparatively small differences across time of day.⁵⁶

⁵⁴ Notice ¶44.

⁵⁵ For example, suppose two networks interconnect to provide a service, and off-peak costs are zero in each network. If each network's peak period corresponds to the other network's off-peak period and peak costs are the same in each network, the efficient price for the consumer of the service would be constant across periods.

⁵⁶ Of course, there may be customers for whom time-of-day differences are important, and nothing in these observations should preclude willing parties from agreeing voluntarily to time-of-day interconnection rates

B. Rate Level Issues

52. The Notice recognizes that the long run incremental cost (LRIC) is the proper basis for efficient pricing of interconnection and other network services, and the FCC's definition of LRIC correctly identifies "the full amount of incremental investment and expenses" with the "furnishing [of] additional quantities of service..."⁵⁷ It also identifies the practical problem of setting appropriate mark-ups above LRIC in order to recover the LEC's shared and common costs. The FCC seeks comment⁵⁸ on five alternative ways to pay for the shared/common costs: (i) requiring services other than LEC-CMRS interconnection to pay, (ii) using Ramsey pricing for all services, (iii) allocating shared costs on the basis of arbitrary allocators such as relative usage levels, (iv) using efficient component pricing, i.e., direct incremental cost plus opportunity cost (or lost contribution), and (v) using a total service long run incremental cost (TSLRIC) measure for groups of services to recover costs shared within those groups. While acknowledging that these approaches all link prices to underlying costs, the FCC remarks that each approach is likely to require "... contentious and time-consuming administrative proceedings to resolve the complex issues raised by cost studies."⁵⁹

1. Recover contribution from retail services rather than interconnection.

53. A general economic principle is that distortions to economic efficiency are smaller when a firm's final (or "retail") goods are priced to provide more contribution toward shared and common costs compared with the contribution supplied by its intermediate goods.⁶⁰ That is, intermediate or "wholesale" goods that are inputs into further production should be marked-up less above incremental cost to recover the fixed costs of the firm because inefficient pricing

⁵⁷ Notice at ¶ 47, footnote 62

⁵⁸ Notice at ¶¶50-54.

⁵⁹ Notice at ¶57.

⁶⁰ This observation is associated with work on optimal taxation by P.A. Diamond and J.A. Mirlees, "Optimal Taxation and Public Production I: Production Efficiency and II: Tax Rules," *American Economic Review* 61, (1971), at 8-27 and 261-278

of an intermediate good will distort the productive efficiency of the firms that use that intermediate good. However, in the telecommunications industry, there has been a long tradition of using wholesale services like carrier access and interconnection to contribute to the recovery of shared and common costs. One economic explanation for this apparent anomaly is that carrier access and interconnection services tend to be the most price-inelastic of all telephone usage services. If they are truly essential facilities that must be purchased from the LEC, their demands are entirely derived from the underlying demand for the retail service.⁶¹ In this case, the same proportionate increase in price above incremental cost would reduce access demand by much less than it would reduce demand for the retail service. At the very least, local and CMRS interconnection prices need not be excused on efficiency grounds from the general need to contribute to the recovery of fixed and common costs.

2. Ramsey pricing for all services

54. Ramsey pricing formalizes the idea discussed above about calibrating the contribution to shared and common cost of a service by the price elasticity of demand for that service. Ramsey pricing sets percentage mark-ups in service prices in inverse proportion to their own-price elasticities, but a more comprehensive formulation recognizes the cross-price elasticities among the different services as well. In general, Ramsey prices are those that lead to the same percentage distortion in demands for individual services so that relative demands are in the same proportion as when prices are set at incremental costs. Ramsey pricing is rarely implemented literally but frequently is used in principle to determine the direction and rough magnitude of efficient price changes.

55. The Notice correctly observes that Ramsey pricing principles were first developed in the context of regulated monopoly, not potentially competitive markets.⁶² However, as Baumol

⁶¹ For example, if carrier access expenditures comprise half the total cost of toll service and carrier access cannot be bypassed, the price elasticity of demand for carrier access would be half the price elasticity of the demand for toll.

⁶² Notice at ¶51.

and Sidak have noted,⁶³ in a competitive market where the market price elasticity for a service may be considerably smaller than the firm-specific elasticity for that service, the Ramsey pricing formula may still be applied for pricing the firm's service if that firm-specific, not the market, elasticity is used instead.

56. Ramsey pricing is sometimes criticized as social policy because it appears to impose the greatest burden on consumers who are least able to escape paying the higher price (i.e., have the fewest alternatives). However, the contribution embedded in the price can be thought of as a tax that distorts or discourages consumption. By definition, the tax that minimizes the distortion in consumption also minimizes the overall loss of economic welfare. So while services (and their consumers) with the lowest price elasticity would be required to contribute more to shared and common costs, economic efficiency would be served because the disruption in demand would be least under such prices.

57. The real issue is not whether strict Ramsey pricing should be practiced for telephone services and, in particular, for local interconnection, but whether Ramsey principles can give insight into desirable directions to change relative prices without requiring information on marginal or incremental costs (often hard to estimate in multiproduct firms) and demand elasticities (often unknown). Strictly speaking, Ramsey prices are optimal only in a very restricted set of pricing alternatives. Non-linear prices--i.e., unit prices that change with demand volumes--in general and multipart tariffs in particular can recover fixed and common costs with smaller efficiency losses than the most accurate set of linear Ramsey prices.⁶⁴ And the experience of telecommunications markets opened to competition suggests that competitive forces push the market price structure towards non-linear prices and multipart tariffs.

⁶³ W.J. Baumol and J.G. Sidak, *Toward Competition in Local Telephony*, (Cambridge: The MIT Press, 1994) at 40.

⁶⁴ Wilson, *Op Cit.*

3. Cost Allocation Based Pricing

58. Of the five approaches cited by the FCC, this method is the least supportable from the standpoint of economic theory. Pricing on the basis of arbitrary cost allocation rules has no intellectual standing in economics.⁶⁵ It lacks economic justification primarily because the necessarily arbitrary method of cost allocation does not respect the cost causation principle. Such prices are particularly troublesome in telecommunications markets where emerging competition makes prices set without regard for cost-causation unsustainable and where such prices can cause inefficient entry and consumption decisions.

4. Efficient Component Pricing

59. Applied to interconnection prices, the principle of efficient component pricing (ECP) is to set the prices that would persist in unregulated markets subject to effective competition. If local interconnection can be treated as an essential service, then the ECP rule would set the interconnection price at the sum of (i) the direct LRIC of interconnection and (ii) the opportunity cost, i.e., the retail contribution lost when local interconnection is provided to another retail competitor. This rule is constructed to ensure that competition in the downstream retail market is efficient, in the sense that both the LEC and its competitors effectively pay the same amount for use of the essential (interconnection) service. If the LEC were to price interconnection below the ECP, retail suppliers whose retail incremental costs were higher than those of the LEC could, contrary to an efficient outcome, nonetheless meet the LEC's retail price and remain in business.

⁶⁵ See, e.g., R.R. Braeutigam, "Optimal Policies for Natural Monopolies," in R. Schmalensee and R.D. Willig (eds.), *Handbook of Industrial Organization*, Vol. 2, (New York: North Holland, 1989) at 1312-1315; and R.R. Braeutigam, "An Analysis of Fully Distributed Cost Pricing in Regulated Industries," *Bell Journal of Economics*, 11(1), 1980 at 182-196.

60. As the Notice observes, the ECP rule does not directly address the source of contribution in the LEC's retail rates.⁶⁶ However, it is not the case that

the ECPR essentially guarantees that the incumbent will recover not only all of its overheads, but also any profits that it would otherwise forego due to the entry of the competitor. (Notice at ¶ 53)

because competition in the retail market would reduce the margin between the interconnection price and the retail price. Moreover, these interconnection prices are the prices that would prevail if the markets for local exchange services and toll usage were fully competitive, and the ECP interconnection price is thus efficient by the competitive market standard that economists generally apply to prices set by regulatory mechanisms where competition, for whatever reason, is not present. No purchaser of interconnection could reasonably expect to be able to buy interconnection without compensating the interconnection provider for all costs entailed by that provision, including the cost of foregone retail opportunities. In addition, the price is efficient because it will bring about competition for retail services. With this price, retail services will be provided to local subscribers by the most efficient—lowest cost—firm. If the competitor's local network is better adapted to providing dial-tone, custom-calling services, carrier access, and local and toll usage, implementation of the efficient interconnection charge will ensure that its price will be below the incumbent LEC's. An interconnection price less than the efficient level would permit the competitor to underprice the LEC for retail services even if it were not more efficient and to divert the current flow of contribution realized from retail services provided by the LEC under its regulated tariffs to the competitor's own uses.

61. Of course, these principles do not justify the incorporation of an unlimited amount of contribution from retail services into the interconnection charge. The incumbent LEC's retail service prices have generally been set at or above incremental cost to make a net revenue contribution to inefficiently priced services—e.g., basic local services and service to rural

⁶⁶ Notice at ¶ 53.

customers—as well as to recover its total costs of providing service.⁶⁷ The fact that the LEC is fully justified in incorporating a contribution to the recovery of common costs in its interconnection charges does not, by itself, justify charges at any particular level. The contribution that the LEC loses when it loses a customer to a competitor is the contribution that was already incorporated—with regulatory approval—in the regulated prices of those services.

5. TSLRIC as a pricing standard

62. As the Notice observes, total service long run incremental cost (TSLRIC) is the appropriate tool, applied at the level of both individual service and groups of services, for detecting cross-subsidies.⁶⁸ The Notice also correctly points out that the

revenue from each service and from all subsets of services must exceed the incremental cost of the service or the subset of services...This test effectively requires that the revenues generated by any group of services that share a common facility recover at least the incremental cost of that facility (Notice at ¶ 54, emphasis added)

The test for cross-subsidization constrains incremental revenue, not price, so that TSLRIC should never be required as a floor for pricing. In circumstances where services are sold at more than one price (e.g., bulk discounts, declining block tariffs, two-part tariffs), the economically efficient floor below which additional units of the service should not be sold is the incremental cost of the additional units. The service as a whole must recover at least the incremental cost of the entire service (including service-specific fixed costs), but any individual units of the service should be permitted be sold at any price that covers the (ordinary) LRIC of supplying those units.

⁶⁷ Even if those other services cover their own marginal costs, the telecommunications industry is one in which, because of the presence of economies of scale or scope or of unrecovered sunk costs, rates uniformly set at incremental costs will fail to cover total costs.

⁶⁸ Notice at 54.

V. CONCLUSION

63. Implementing bill and keep for CMRS-LEC interconnection because of its purported simplicity would create far more serious problems than those it is alleged to solve. Bill and keep pricing represents a step away from competitive market conditions: it moves prices away from costs and it replaces bargaining among market participants with regulatory fiat. It does not generate price signals that lead to efficient economic behavior, and it will distort the coming competition between wireless and wireline carriers. The proposal makes no provision for the recovery of contribution currently obtained from CMRS interconnection prices, and there is no reason why subscriber of other interconnecting networks (or subscribers of an incumbent LEC's retail services) should have to bear the additional expense. There is no clear evidence that the current process is fatally defective, and the wiser course would be to treat CMRS interconnection consistently with the interconnection of other networks that it will examine in the Interconnection Proceeding mandated by Congress and the Commission's upcoming Access Reform Proceeding.

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- 1985- Journal of Econometrics, North-Holland Publishing Company.
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TESTIMONIES

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